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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appl. No.	:	09/850,960
Appellant(s)	:	JACKSON, Andrew, et al.
Filed	:	8 May 2001
Title	:	150W-1000W MASTERCOLOR CERAMIC METAL HALIDE LAMP SERIES WITH COLOR TEMPERATURE
TC/A.U.	:	2841
Examiner	:	PHAN, T. S.
Atty. Docket	:	PHUS 010247

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On: May 3, 2004

By: John C Fox

APPELLANT'S APPEAL BRIEF

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BRIEF OF APPELLANT

This Brief of Appellant follows a Notice of Appeal, dated 4 March 2004, appealing the final rejection of claims 1-19 and 31-36 of the application, the final rejection dated 4 December 2003. All requisite fees set forth in 37 CFR 1.17(c) for this Brief are hereby authorized to be charged to Deposit Account No. 501850.

REAL PARTY IN INTEREST

The real party in interest in this appeal is the assignee of all rights in and to the subject application, Koninklijke Philips Electronics, N.V. of The Netherlands.

RELATED APPEALS AND INTERFERENCES

To the best of the knowledge of the undersigned, no other appeals or interferences are known to Appellants, Appellants' legal representatives, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

STATUS OF CLAIMS

Of the original claims 1-29, claims 20 through 30 were withdrawn from consideration, claims 1, 3 and 16 through 19 were amended, and claims 31 through 36 were added. Claims 1-19 and 31-36 stand finally rejected as set forth in the final Office Action dated 4 December 2003, and are the subject of this appeal.

STATUS OF AMENDMENTS

No amendment to the specification and/or claims was offered subsequent to the final Office action. All amendments have been entered.

SUMMARY OF THE INVENTION

The invention relates to a high-pressure discharge lamp, and more particularly relates to a high intensity discharge (HID) lamp of the type having a ceramic-walled discharge vessel. (Specification, page 1, lines 5-16)

High intensity discharge (HID) lamps are commonly used in large area lighting applications, due to their high energy efficiency and superb long life. The existing HID product range consists of mercury vapor (MV), high pressure sodium (HPS), and quartz metal halide (MH) lamps. (Specification, page 1, line 19 through page 2, line 1)

In recent years, ceramic metal halide lamps (for example, Philips MasterColor® series) have entered the market place. Compared to the conventional HID lamps, the ceramic metal halide lamps display excellent initial color consistency, superb stability over life (lumen maintenance >80%, color temperature shift <200K at 10,000 hrs), high luminous efficacy of >90 lumens/watt and a lifetime of about 20,000 hours. These highly desirable characteristics are due to the high stability of the polycrystalline alumina (PCA) envelopes and a special mixture of salts, which emits a continuous-spectrum light radiation close to natural light. (Specification, page 1, lines 1-10)

The salt mixture used in Philips MasterColor® series lamps is composed of NaI, CaI_2, TlI, and rare-earth halides of DyI_3, HoI_3 and TmI_3. NaI, CaI_2 and TlI are mainly for emitting high intensity line radiation at various colors, but they also contribute to continuous radiation. The rare-earth halides are for continuous radiation throughout the visible range, resulting

in a high color rendering index (CRI). By adjusting the composition of the salts, color temperatures of 3800-4500K, and a CRI of above 85 can be achieved. The existing power range of such lamps is from 20W to 150W. The relatively narrow power range makes these products suitable only for low power installations, such as most indoor low-ceiling retail spaces. For larger area, higher power applications, requiring a lamp power of 200W to 1000W, the primary available products are MV, HPS and MH lamps. **(Specification, page 2, line 12 through page 3, line 2)**

U.S. patent 5,424,609 discloses a lamp having a comparatively low power of 150 W at an arc voltage of approximately 90 V. Because the electrode in such a lamp conducts comparatively small currents during operation, the dimensions of the electrode may remain comparatively small. For higher power lamps, electrodes of larger dimensions are required. Consequently, the diameter of the internal plug which surrounds the electrode is larger. It has been found that in such higher power lamps there is an increased risk of premature failure, for example due to breaking off of the electrode or cracking of the plug. (Specification, page 3, lines 3-16)

According to a first embodiment of the invention, there is provided a discharge lamp (1) comprising a ceramic discharge vessel (20) enclosing a discharge space (21), first and second discharge electrode feedthrough means (30, 40), and first and second current conductors (12, 13) connected to said first and second discharge electrode feedthrough means (30, 40), respectively; the discharge vessel (20) having a fill containing a salt mixture comprised of sodium iodide, calcium iodide, thallium iodide and one or more rare earth iodides. (Specification, page 4, lines 16, 17; page 2, lines 12-14;

Figures 8 and 9; claim 1)

The lamp has a power range of about 150W to about 1000W and exhibits one or more of the following characteristics: a CCT (correlated color temperature) of about 3800 to about 4500K; a CRI (color rendering index) of about 70 to about 95; a MPCD (mean perceptible color difference) of about $\pm$10; and a luminous efficacy up to about 85-95 lumens/watt. (Specification, page 5, lines 1-6)

According to preferred embodiments of the invention, the arc tube (20) has an aspect ratio (IL/ID) in the range of about 3.3 to about 6.2. (Specification, page 13, line 17; claim 34)

ISSUES

The issues on appeal are:

1. Are claims 1-19 and 31-36 unpatentable under 35 USC 103(a) over Van Vliet et al. (U.S. patent 5,973,453) (herein 'Van Vliet') in view of Krasko et al. (U.S. patent 5,694,002) (herein 'Krasko')?

2. Are claims 3-16 unpatentable under 35 USC 103(a) over Van Vliet in view of Van Der Leeuw et al. (U.S. patent 5,532,543) (herein 'Van Der Leeuw')?

GROUPING OF CLAIMS

Claims 1, 2, 17-19 and 31-36 stand or fall together; and claims 3-16 stand or fall together.

ARGUMENT

1. Are claims 1-19 and 31-36 unpatentable under 35 USC 103(a) over Van Vliet in view of Krasko?

Claims 1-19 and 31-36 stand finally rejected under 35 U.S.C. 103(a) as being unpatentable over Van Vliet in view of Krasko.

Van Vliet discloses a ceramic metal halide discharge lamp with a sodium iodide/cerium iodide filling.

Krasko discloses a metal halide lamp with improved color characteristics.

Van Vliet is said to disclose the claimed invention except for a luminous efficacy up to about 85-95 lumens/watt, and Krasko is said to show a metal halide lamp with a luminous efficacy of about 90 lumens/watt.

With respect to claim 1 and its dependent claims 2 and 36, claim 1 specifies the salt mixture present in the discharge vessel, i.e., sodium iodide, calcium iodide, thallium iodide and one or more rare earth iodides. The salt mixture is specially designed for the power range and arc tube geometry used for this product family.

Neither of the applied references teach or suggest such a salt mixture.

Van Vliet teaches a mixture of sodium iodide and cerium iodide. See, e.g., col. 2, line 20. Krasko teaches a fill including the halides of sodium, scandium, lithium, dysprosium and thallium. See, e.g., col. 1, lines 63 and 64.

While the prior art mixtures all contain a sodium halide, none teach or suggest calcium iodide or the particular combination of iodides of sodium, calcium, thallium and at

least one rare earth taught and claimed by Appellant.

Accordingly, it is urged that claims 1, 2 and 36 are patentable over the teachings of the applied references, and that the rejection is in error and should be reversed.

With respect to claim 3 and its dependent claims 4-16, these claims are directed to structural limitations related to the discharge vessel, and specifically to the arc tube and the associated four-part feedthrough assembly.

Neither of the cited references teach or suggest such a lamp having a four-part lead through assembly.

Van Vliet teaches a ceramic metal halide discharge lamp having a three-part leadthrough assembly including a Nb lead-in (40,50), a Mo/alumina cermet (41,51) and a refractory electrode (4,5) including a coil (4c,5c).

Krasko teaches a metal halide lamp having a quartz discharge tube rather than a ceramic discharge tube. Regarding the assertion that Krasko discloses the use of metal halides in a 'ceramic quartz' vessel, this is not a term of art. Ceramic and quartz vessels are distinct entities having significantly different characteristics. For a discussion of the differences between quartz and ceramic discharge lamps, see the first paragraph of the Background of the Invention section bridging pages 1 and 2 of Appellant's specification. Moreover, Krasko is concerned with the chemical fill inside the discharge space, and teaches nothing with respect to the composition of the electrical leads (26,28).

Accordingly, neither of the cited references teach or suggest, alone or in combination, a ceramic discharge lamp with a four-part feedthrough assembly, and claim 3 and its dependent claims 4-16 are patentable over Van Vliet in view of Krasko. Accordingly, it is urged that the rejection is in error and

should be reversed.

With respect to claims 17-19, neither of the cited references teach or suggest, alone or in combination, the design space parameters claimed.

With respect to claims 31-33, neither of the cited references teach or suggest, alone or in combination, the particular combinations of CCT (correlated color temperature), CRI (color rendering index), MPCD (mean perceptible color difference), luminous efficacy, lumen maintenance, color temperature shift and lifetime for a lamp within the power range of about 150W to about 1000W.

With respect to claims 34 and 35, neither of the cited references teach or suggest, alone or in combination, the particular combination of one or more of a characteristic selected from the group consisting of CCT (correlated color temperature), CRI (color rendering index), MPCD (mean perceptible color difference), and luminous efficacy, for a discharge lamp whose arc tube has an aspect ratio (IL/ID) in the range of about 3.3 to about 6.2.

Accordingly, it is urged that claims 1-19 and 31-36 are patentable over the combination of Van Vliet and Krasko and that therefore the rejection is in error and should be reversed.

2. Are claims 3-16 unpatentable under 35 USC 103(a) over Van Vliet in view of Van Der Leeuw?

Claims 3-16 stand finally rejected under 35 U.S.C. 103(a) as being unpatentable over Van Vliet in view of Van Der Leeuw.

Van Vliet teaches a ceramic metal halide discharge lamp having a three-part lead through assembly including a Nb lead-

in (40,50), a Mo/alumina cermet (41,51) and a refractory electrode (4,5) including a coil (4c,5c).

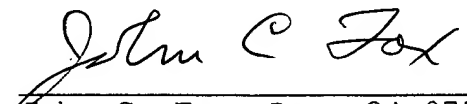
Van Der Leeuw, like Krasko, discloses a quartz metal halide lamp, not a ceramic metal halide lamp. See, e.g., col. 5, line 29. Moreover, Van Der Leeuw shows a feedthrough assembly (see, e.g., Fig. 3) which includes a feedthrough of Mo wire connected to an electrode 15 of conventional design. See col. 5, line 46 and col. 6, lines 52, 53.

Accordingly, neither of the cited references teach or suggest, alone or in combination, a ceramic discharge lamp with a four-part feedthrough assembly, and claim 3 and its dependent claims 4-16 are patentable over Van Vliet in view of Van Der Leeuw. Accordingly, it is urged that the rejection is in error and should be reversed.

CONCLUSION

Accordingly, it is urged that each of the rejections is in error, and Appellant respectfully requests that the Board reverse the Examiner's final rejections.

Respectfully submitted,



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APPENDIX A

CLAIMS ON APPEAL

1. (previously amended) A discharge lamp comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a mixture of metal halides, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively;

said discharge vessel having a fill containing a salt mixture comprised of sodium iodide, calcium iodide, thallium iodide and one or more rare earth iodides;

said lamp having a power range of about 150W to about 1000W and exhibiting (a) one or more of a characteristic selected from the group consisting of a CCT (correlated color temperature) of about 3800 to about 4500K, a CRI (color rendering index) of about 70 to about 95, a MPCD (mean perceptible color difference) of about $\pm$10, and (b) a luminous efficacy up to about 85-95 lumens/watt.

2. (original) A lamp as claimed in Claim 1 retrofit with ballasts and lighting fixtures designed for high pressure sodium or quartz metal halide lamps.

3. (previously amended) A discharge lamp having a power range of about 150W to about 1000W, exhibiting (a) one or more of a characteristic selected from the group consisting of a CCT (correlated color temperature) of about 3800 to about 4500K, a CRI (color rendering index) of about 70 to about 95, a MPCD

(mean perceptible color difference) of about ±10, and (b) a luminous efficacy up to about 85-95 lumens/watt, and comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a mixture of metal halides, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively,

wherein the ceramic discharge vessel comprises: an arc tube comprising a cylindrical barrel having a central axis; a pair of opposed end walls; and a pair of ceramic end plugs extending from respective end walls along said axis; and

wherein the electrode feedthrough means each extends through a respective end plug and each comprises: a lead-in of niobium which is hermetically sealed into the arc tube, a central portion of molybdenum/aluminum cermet, a molybdenum rod portion and an electrode comprising a tungsten rod having a winding of tungsten.

4. (original) A lamp as claimed in Claim 3, wherein the arc tube has a molybdenum coil attached to its surface.

5. (original) A lamp as claimed in Claim 4, wherein the discharge space contains an ionizable filling of an inert gas, a mixture of metal halides, and mercury.

6. (original) A lamp as claimed in Claim 5 wherein, said discharge vessel has a ceramic wall and is closed by a ceramic plug, said electrode feedthrough means including at least one tungsten electrode which is connected to a niobium electric

current conductor by means of a leadthrough element which projects into the ceramic plug with a tight fit, is connected thereto in a gas-tight manner by means of a sealing ceramic and has a part formed from aluminum oxide and molybdenum which forms a cermet at the area of the gas-tight connection.

7. (original) A lamp as claimed in Claim 5, wherein, said discharge vessel has a ceramic wall and is closed by a ceramic plug, said electrode feedthrough means including at least one tungsten electrode which is connected to a niobium electric current conductor by means of a leadthrough element which projects into the ceramic plug with a tight fit, is connected thereto in a gas-tight manner by means of a sealing ceramic and has a first part formed from aluminum oxide and molybdenum which forms a cermet at the area of the gas-tight connection and a second part which is a metal part and extends from the cermet in the direction of the electrode.

8. (original) A lamp as claimed in Claim 7, wherein the metal part is a molybdenum rod.

9. (original) A lamp as claimed in Claim 5, wherein the arc tube has an aspect ratio (IL/ID) in the range of about 3.3 to about 6.2.

10. (original) A lamp as claimed in Claims 6 and 7, wherein the electrode has a tip extension in the range of about 0.2 to about 1mm; the cermet contains at least about 35 wt.% Mo with the remainder being Al_2O_3, and the as sealing ceramic flow completely covers the Nb connector.

11. (original) A lamp as claimed in Claim 10, wherein the arc tube and the electrode feedthrough means have the following characteristics for a given lamp power:

Power	IL	ID	IL/ID Aspect	Wall Loading	Wall Thickness	Rod Diameter	Rod Length
W	mm	mm	Ratio, mm	W/cm^2	mm	mm	mm
150	26-32	5-7	3.3-6.2	20-35	0.8-1.1	0.4-0.6	3-6
200	27-32	6.5-7.5	3.3-6.2	25-30	0.85-1.2	0.4-0.6	4-8
250	28-34	7.5-8.5	3.3-6.2	25-35	0.9-1.3	0.7-1.0	6-10
300	30-36	8-9	3.3-6.2	25-37	0.92-1.4	0.7-1.0	6-10
350	33-40	8.5-10	3.3-6.2	24-40	0.98-1.48	0.7-1.1	6-11
400	36-45	8.5-11	3.3-6.2	22-40	1.0-1.5	0.7-1.1	6-11

12. (original) A lamp as claimed in Claim 11, wherein said metal halide mixture comprises the following salts of 6-25 wt% NaI, 5-6 wt% TlI, 34-37 wt% CaI_2, 11-18 wt% DyI_3, 11-18 wt% HoI_3, and 11-18 wt% TmI_3.

13. (original) A lamp as claimed in Claim 12, wherein the ionizable filling is a mixture of about 99.99% of Xenon and a trace amount of ^{85}Kr radioactive gas.

14. (original) A lamp as claimed in Claim 12, wherein the ionizable filling is a mixture of Argon (and/or Krypton), Xenon and a trace amount of ^{85}Kr radioactive gas.

15. (original) A lamp as claimed in Claim 12, wherein the ionizable filling is Xenon (and/or Krypton).

16. (previously amended) A lamp as claimed in Claim 5 and 13,

having a power range of about 150W to about 1000W and nominal voltage of 100V to 260V, and one or more of the following characteristics: a lumen maintenance of >80%, a color temperature shift <200K from 100 to 10,000 hours, and lifetime of about 10,000 to about 25,000 hours.

17. (previously amended) A discharge lamp having a power range of about 150W to about 1000W and comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a metal halide mixture, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively, the said lamp exhibiting characteristics defined by a design space of parameters comprising at least one of the following parameters:

(i) the arc tube length, diameter and wall thickness limits of said discharge lamp correlated to and expressed as functions of lamp power, and/or color temperature, and/or lamp voltage; and

(ii) the electrode feedthrough structure limits used to conduct electrical currents with minimized thermal stress on the arc tube correlated to and expressed as a function of lamp current.

18. (previously amended) A lamp as claimed in Claim 17, wherein the design space parameters also include:

(i) a general aspect ratio of the inner length (IL) to the inner diameter (ID) of the arc tube body that is higher than that of ceramic metal halide lamps having a power of less than about 150W;

(ii) the upper and lower limits of electrode rod diameter correlated to and expressed as a function of lamp current; and

(iii) a composition range of the salts correlated to color temperature and lamp voltage.

19. (previously amended) A Lamp as claimed in Claim 18 wherein the design space parameters include the following characteristics for the design of an arc tube and electrode feedthrough means for a given lamp power:

Power	IL	ID	IL/ID Aspect	Wall Loading	Wall Thickness	Rod Diameter	Rod Length
W	mm	mm	Ratio, mm	W/cm^2	mm	mm	mm
150	26-32	5-7	3.3-6.2	20-35	0.8-1.1	0.4-0.6	3-6
200	27-32	6.5-7.5	3.3-6.2	25-30	0.85-1.2	0.4-0.6	4-8
250	28-34	7.5-8.5	3.3-6.2	25-35	0.9-1.3	0.7-1.0	6-10
300	30-36	8-9	3.3-6.2	25-37	0.92-1.4	0.7-1.0	6-10
350	33-40	8.5-10	3.3-6.2	24-40	0.98-1.48	0.7-1.1	6-11
400	36-45	8.5-11	3.3-6.2	22-40	1.0-1.5	0.7-1.1	6-11

31. (previously added) A discharge lamp comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a mixture of metal halides, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively;

said lamp having a power range of about 150W to about 1000W and exhibiting the characteristics of a CCT (correlated color temperature) of about 3800 to about 4500K, a CRI (color rendering index) of about 70 to about 95, a MPCD (mean perceptible color difference) of about $\pm$10, and a luminous efficacy up to about 85-95 lumens/watt.

32. (previously added) A discharge lamp comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a mixture of metal halides, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively;

said lamp having a power range of about 150W to about 1000W and exhibiting the characteristics of a lumen maintenance >80%, a color temperature shift <200K at 10,000 hours, a lifetime of about 20,000 hours, and a luminous efficacy >90 lumens/watt.

33. (previously added) A discharge lamp comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a mixture of metal halides, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively;

said lamp exhibiting the characteristics of a lumen maintenance >80%, a color temperature shift <200K from 100 to 8000 hours, and a lifetime of about 10,000 to about 25,000 hours regardless of the rated power.

34. (previously added) A discharge lamp having a power range of about 150W to about 1000W, exhibiting (a) one or more of a characteristic selected from the group consisting of a CCT (correlated color temperature) of about 3800 to about 4500K, a CRI (color rendering index) of about 70 to about 95, a MPCD

(mean perceptible color difference) of about ±10, and (b) a luminous efficacy up to about 85-95 lumens/watt, and comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a mixture of metal halides, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively,

wherein the arc tube has an aspect ratio (IL/ID) in the range of about 3.3 to about 6.2.

35. (previously added) A discharge lamp having a power range above 150W and exhibiting (a) one or more of a characteristic selected from the group consisting of a CCT (correlated color temperature) of about 3800 to about 4500K, a CRI (color rendering index) of about 70 to about 95, a MPCD (mean perceptible color difference) of about ±10, and (b) a luminous efficacy up to about 85-95 lumens/watt, and comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a mixture of metal halides, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively, wherein the aspect ratio (IL/ID) is in the range of about 3.3 to about 6.2mm.

36. (previously added) A lamp as claimed in Claim 1, having a power range of about 150W to about 1000W and nominal voltage of 100V to 260V, and one or more of the following characteristics:

a lumen maintenance of >80%, a color temperature shift <200K from 100 to 10,000 hours, and lifetime of about 10,000 to about 25,000 hours.